REMARKS

Status of the Claims

Claim 1 has been canceled without prejudice or disclaimer. Claims 2 has been rewritten in independent form. Claim 3 has been amended to depend from claim 2. Claims 4-26 have been withdrawn from consideration. Claims 2-3 are pending and at issue.

In the Office Action, claims 1 and 3 stand rejected as obvious over Kazuo (JP06-128671); claims 1-3 stand rejected as obvious over Sauerz et al. (US 6,106,643) in view of any of Bieber et al. (US 3,619,182), Olson (US 3,619,183), Baldwin et al., (US 3,918,964) or Peterson (US 3,984,239); and claims 1-3 stand provisionally rejected on the basis of non-statutory obviousness-type double patenting over claim 15 of co-pending Application No. 10/546,130.

Features of the present invention

The present invention provides a Ni based alloy with excellent corrosion resistance relative to supercritical water environments containing inorganic acids comprising in weight basis: Cr: from 43% to 50%, Mo: 0.1% to 2%, Mg: 0.001% to 0.05%, No. 0.001% to 0.04%, Mn: 0.05% to 0.5%, further comprising either one, or both, of Fe: 0.05% to 1.0% and Si: 0.01% to 0.1%, and a remainder as Ni and unavoidable impurities, wherein a quantity of C amongst the unavoidable impurities is restricted to 0.05% or less, and a member for a supercritical water process reaction apparatus, comprising the above-described Ni based alloy.

Claim Objections

The claims have been objected to because the basis of the percentages is not specified. Claim 2 has been amended to recite that the percentages are based on weight. Applicants request that this rejection be withdrawn.

Obviousness Rejection over Kazuo (JP06-128671)

Claim 1 stands rejected as obvious over Kazuo (JP06-128671). Claim 1 has been canceled, rendering this rejection moot.

In addition, the Applicants note for the record that Kazuo is not relevant to the present application because Kazuo discloses a nickel based alloy for use with lead-containing hot water as well as in a highly alkali environment.

Obviousness Rejection over Sauerz et al. (U.S. Pat. No. 6,106,643) in view of Bieber et al. (U.S. Pat. No. 3,619,182), Olson (U.S. Pat. No. 3,619,183), Baldwin et al., (U.S. Pat No. 3,918,964) or Peterson (U.S. Pat. No. 3,984,239)

The Examiner cites Sauerz et al. to reject claims 1 to 3 as obvious. The Sauerz reference discloses a nickel-chromium alloy for use in hot working to alter the shape of the alloy at a temperature of at least 900°. The nickel-chromium alloy contains by weight percent Cr:43-65, Ca: 0.002 to 0.1, Mg: 0.02-0.1, total of B+RE+Zr: <0.05, and balance Ni.

Sauerz discloses incorporating Ca as an essential component in the nickel based alloy. The nickel base alloy of present application does not contain Ca, because Ca in the alloy deteriorates the corrosion resistance to supercritical water environments. Claim 2 does not allow for the inclusion of Ca in the amounts disclosed in Sauerz.

As Sauerz contains Ca, Sauerz does not disclose features of the present application that the present nickel-chromium alloy exhibits not only (a) a high corrosion resistance to supercritical water environments containing inorganic acids, but also (b) a suppression effect suppressing deterioration of corrosion resistance due to aging in an operating temperature range a supercritical water process reaction apparatus.

The Examiner, however, seems to assume that, since the alloy disclosed by Sauerz et al. is a nickel based alloy, the nickel based alloy by Sauerz et al. has a high corrosion resistance in the supercritical water environment and has an effect of suppressing deterioration of corrosion

resistance due to aging, in other words, has a long-term corrosion resistance in the operating temperature range of the supercritical water process reaction apparatus.

However, the Sauerz reference does not disclose the features of the present application in terms of high corrosion resistance to the supercritical water environment containing inorganic acids, and furthermore, simultaneous incorporation of N, Mn and Mg, which are effective in stabilizing the fcc phase of the Ni-based alloy, thereby improving the long-term stability of the corrosion resistance by suppressing deterioration of corrosion resistance due to aging by stabilizing the fcc phase of the nickel base alloy.

Bieber et al. (U.S. Patent No. 3,619,182) discloses a cast nickel base alloy containing for example, Cr: 24-42%, Mo: 3-22%, C: 0.15-1.2%, B: 0-0.8%, and balance Ni, wherein N should be restricted as low as possible (col. 3, lines 1 to 8). The alloy purportedly exhibits resistance to oxidization and hot corrosion, and a low coefficient of thermal expansion.

The Bieber references does not indicate the feature of the present application that the nickel base alloy has a high corrosion resistance to supercritical water environment containing inorganic acids. Since the content of N is restricted to be as low as possible in the Bieber reference, the Bieber reference does not teach or suggest the incorporation of N with Mn and Mg to stabilize the fcc phase, which provides the nickel base alloy with long-term stability in high corrosion resistance. Accordingly, Bieber does not teach or suggest incorporating a combination of N, Mn and Mg in the nickel based alloy to stabilize the fcc phase of the alloy.

Olson (U.S. Pat. No. 3,619,183) discloses a nickel-base alloy adaptable for use as structural components at temperature on order of 1000°F. The Olson reference does not indicate that its nickel base alloy has a high corrosion resistance to supercritical water environment containing inorganic acids. In addition, the Olson reference discloses that the content of N in the alloy should be restricted as low as is practical (col. 2, lines 43 to 45), which means that the Olson reference also does not teach or suggest the role of N with Mn and Mg for stabilization of fcc phase

in the nickel base alloy in order to attain the long-term stability in high corrosion resistance to supercritical water environment containing inorganic acids.

Baldwin (U.S. Pat. No. 3,918,964) discloses a nickel base alloy consisting predominantly of Ni, Cr, Mo, C, B, purportedly having a desirable combination of properties including, high temperature strength, resistance to oxidation and hot corrosion and low thermal expansion. The Baldwin reference restricted the content of N as low as possible (col. 4, lines 41-43). Baldwin et al. neither indicates that the nickel base alloy has a high corrosion resistance to the supercritical environment, nor discloses the importance of addition of N with Mn and Mg in the composition for stabilization of the fcc phase in order to provide the nickel base alloy a long-term stability of the corrosion resistance.

Peterson (U.S. Pat. No. 3,984,239) discloses an alloy particularly suited for use as an inert gas shielded-arc filler metal consisting Ni, Cr, Fe, Al, Mn, Si, and Ti, which may not be applicable to the supercritical water process material. Peterson does not mention the corrosion resistance of its nickel base alloy to the supercritical environment and also does not indicate that the nitrogen level should be maintained at very low levels in order to avoid zone cracking (see col. 3, lines 32-43). Peterson also does not mention the role of stabilizing the fcc phase of the Ni based alloy. Therefore, the Peterson reference neither discloses the features of the present invention that the present nickel base alloy has a high corrosion resistance to supercritical water environment containing inorganic acids, and has a long-term stability in corrosion resistance by incorporation of N, Mn and Mg and by stabilizing the fcc phase of the nickel based alloy.

As described above, the cited references, alone or in combination, neither discloses nor suggests that the nickel based alloy of the present invention has a high corrosion resistance to supercritical water environment containing inorganic acids, and members for a supercritical water process reaction apparatus made of the present nickel base alloy. In addition, the cited references do not disclose or suggest that the incorporation of N, Mn and Mg in the nickel base alloy stabilizes the alloy phase of the nickel base alloy, which serves to promote long-term corrosion resistance of

the present nickel base alloy by stabilizing the crystal phase. Applicants request that the obviousness rejection be withdrawn.

Provisional Obviousness-type Double Patenting Rejection over claim 15 of U.S.S.N. 10/546,130

Applicants will address the provisional double patenting rejection upon the finding of allowable subject matter in the respective applications.

In view of the above amendment and remarks, applicant requests that the Examiner acknowledge the allowability of claims 2 and 3.

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Respectfully submitted,

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